MP 10: Gravitation, Felder und Schwarze Löcher

Zeit: Donnerstag 11:00–12:20 Raum: HS 23

MP 10.1 Do 11:00 HS 23

Temperature of quantum matter near spherically symmetric apparent horizons — •Felix Kurpicz[1,2], Nicola Pinamonti[3,4], and Rainer Verch[2] — [1]Max-Planck-Institute for Mathematics in the Sciences (Leipzig) — [2]Institute for Theoretical Physics, University of Leipzig — [3]Dipartimento di Matematica, Università di Genova — [4]Istituto Nazionale di Fisica Nucleare (Genova)

In this talk, we discuss the form taken by quantum matter fields in the proximity of the apparent horizon which is formed during a spherically symmetric gravitational collapse and/or black hole evaporation. Our analysis is performed by discussing the form of the two-point function of a Klein-Gordon field in an arbitrary Hadamard state. We present a suitable scaling procedure that leads to a thermal distribution along integral lines of the Kodama vector field, which prescribes a preferred time direction on spherically symmetric spacetimes.

The temperature of the thermal distribution depends on the point of the apparent horizon that is tested, thus allowing an analysis of kinematical temperature changes along the horizon. The effect is universal in the sense that it does not depend on any particular matter model or a specific Hadamard state. The thermal nature of the two-point function can also be related to the tunneling probabilitiy of particles (defined with respect to the Kodama field) across the horizon.

MP 10.2 Do 11:20 HS 23

A Bound on Relativistic Correlators at Large Spacelike Momenta — •Souvik Banerjee[1], Kyriakos Papadodimas[2], Suvrat Raju[3], Prashant Samantray[4], and Pushkal Shrivastava[3] — [1]Uppsala University, Uppsala, Sweden — [2]ICTP, Trieste, Italy — [3]ICTS, Bengaluru, India — [4]BITS, Hyderabad, India

In this work we study Wightman functions in a relativistic quantum field theory, in the limit where the momenta of the insertions are spacelike and large. We show that this correlator must die off at least as fast as Exp[R] where R is the radius of the smallest sphere that contains the polygon formed by the momenta. We show that holographic correlators at large-N have a characteristic behaviour in this limit that does not saturate the bound. A q-point holographic correlator saturates the bound at order q in 1/N perturbation theory through bulk loop diagrams. Perturbative quantum field theories have a different characteristic behaviour, and also saturate the bound through suitably high-order loops. We conclude with some comments on the behaviour of generic relativistic field theories. This work has direct connection to the understanding of evanescent modes arising in the case of black holes in AdS. This is also deeply related to the understanding of reconstruction of bulk AdS spacetime using CFT data in the light of AdS/CFT correspondence and more specifically the subregion duality.

MP 10.3 Do 11:40 HS 23

Quantum theory of charged black hole horizons — •Konstantin Eder — Lehrstuhl für Theoretische Physik III/Quantengravitation, FAU Erlangen-Nürnberg

We describe the quantum theory of isolated horizons with electromagnetic or non-Abelian gauge charges in the framework of Loop Quantum Gravity. We consider the distorted case, and its spherically symmetric limit. We show that the gravitational horizon d.o.f. give rise to the Bekenstein-Hawking relation, with lower-order terms giving some corrections for small black holes. Furthermore, we demonstrate that one can include matter d.o.f. in the state counting. We show that one can expect (potentially divergent) contributions proportional to the area, as well as logarithmic corrections proportional to the horizon charge. This is qualitatively similar to results on matter contributions obtained with other methods in the literature.

MP 10.4 Do 12:00 HS 23

Poisson brackets for Einstein gravity with Kalb-Ramond field and dilaton — •Eugenia Boffo and Peter Schupp — Jacobs University, Bremen, Germany

We formulate Einstein gravity with the field strength of an antisymmetric 2-form, conformally coupled to a scalar field ϕ with its own kinetic term, as the mechanics of a graded Poisson structure with some Hamiltonian Θ.

A relevant feature of our formulation is that we allow the extended graded phase space to have a connection which is curvatureless. The setup admits also an elegant description in terms of an algebroid on the sections of $TM \oplus T^*M$, and hence a subsequent connection inherited from the one we start with. The derived curvature scalar, projected to the standard tangent space, will then automatically include all the relevant fields (metric, Kalb-Ramond and dilaton) in the right way.

We expect that some slightly different Poisson brackets will account for the non-geometric flux of the open strings metrics.